

TAXONOMIC REVISION OF *GENIOSTEMON* (GENTIANACEAE)

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ABSTRACT

The genus *Geniostemon*, previously thought to have but two species, is revised as having four species: *G. atarjanum* B.L. Turner, *spec. nov.* (from easternmost Guanajuato, México); *G. coulteri* (from Hidalgo, México); *G. gypsophilum* B.L. Turner, *spec. nov.* (from Nuevo León, México); and *G. schaffneri* (from San Luis Potosí, México). Revised and/or complete descriptions of each of the species are given, along with a key and distributional maps.

KEY WORDS: Gentianaceae, *Geniostemon*, México

Geniostemon was heretofore thought to be a small genus of only two species from northeastern México. It was first proposed by Engelmann & Gray in 1881 to accommodate *G. coulteri* and *G. schaffneri*. The genus is largely distinguished from *Centaurium* by its 4-merous flowers and noncoiled anthers, and was maintained by Gilg (1895), who thought it not especially close to *Centaurium*, placing it between the genera *Bisgoeppertia* and *Cicenda* of his subtribe Erythriinae noting, however, that its pollen was similar to that of *Neurotheca*, a monotypic genus of South America.

Except for its uncoiled anthers and 4-merous flowers, *Geniostemon* might fit comfortably into *Centaurium*, and I suggest here that a more intensive study might show its relationship to be within or near that large genus although, to my knowledge, this has not been suggested by yet other workers.

Geniostemon Engelm. & A. Gray

Erect or prostrate, annual or perennial (?) herbs to 15 cm high. Leaves opposite, small, linear-oblongate to ovate-lanceolate, the margins entire. Flowers terminal, one to a stem, or forming leafy terminal cymes by branching

of the upper stems. Sepals 4, separate or nearly so. Petals 4, the tube somewhat longer than the lobes, the latter pink or white. Stamens 4, inserted on the tube; filaments bearing numerous short glandular hairs at its mid-portion (rarely seemingly absent in *Geniostemon gypsophilum* B.L. Turner); anthers yellow, uncoiled. Pistil glabrous, the style fused throughout or nearly so, often bifid at the apex, the stigmatic portion papillose. Capsule narrowly ovoid, dehiscent into halves, the seeds more or less ovoid or globose with an alveolate-like surface ornamentation. Type species: *Geniostemon coulteri* Engelm. & A. Gray

Key to species

1. Stiffly erect or ascending annual herbs; corollas 4-8 mm long (tube-lobe length); San Luis Potosí and Nuevo León.
 2. Corolla lobes mostly 4-5 mm long; anthers 0.8-1.2 mm long; foliage drying green; San Luis Potosí. *G. schaffneri*
 2. Corolla lobes mostly 2-3 mm long; anthers 0.5-0.7 mm long; foliage drying blackish green; Nuevo León. *G. gypsophilum*
1. Sprawling or mat-forming perennial (?) herbs; corollas 12-14 mm long; Guanajuato, Querétaro?, and Hidalgo.
 3. Foliage and stems markedly beset with minute hair-like papillose enations; corollas 13-14 mm long (tube-lobe length); easternmost Guanajuato and adjacent Querétaro? *G. atarjanum*
 3. Foliage and stems glabrous; corollas ca. 12 mm long; Hidalgo. *G. coulteri*

Geniostemon atarjanum B.L. Turner, *spec. nov.* TYPE: MEXICO. Guanajuato: El Charco, 12 km SE of Atarjea, "matorral arbustivo, ladero de cerro, sobre peñas", 1500 m, *E. Ventura & E. López 6361* (HOLOTYPE: TEX!).

Geniostemonem coulteri Engelm. & A. Gray similis sed foliis ac caulibus minute papillatis (vs. glabris) et corollis majoribus (longitudine tubi-lobi 13-14 mm vs. ca. 12 mm).

Prostrate perennial (?) herbs 3-6 cm high. Stems with papillose enations, the leaves about as long as the internodes. Midstem leaves linear-oblong to ovate, mostly 6-8 mm long, 2-4 mm wide, the margins papillose like the

stems; petioles 2-3 mm long, grading into the blades. Flowers mostly single and terminal on pedicels 5-10 mm long. Sepals ca. 6 mm long, linear lanceolate, glabrous, the apices acicular. Corollas 13-14 mm long, reportedly rose-colored, the lobes 8-10 mm long, 3-4 mm wide. Stamens exerted for ca. 7 mm; filaments 5-6 mm long, glandular-pubescent for ca. 1/2 its length near the middle, the hairs ca. 0.15 mm long; anthers yellow, ca. 1 mm long. Styles ca. as long as the stamens, the apices flabellate and somewhat bilobed. Capsules ellipsoid, 6-7 mm long, ca. 2 mm wide. Seeds immature.

This taxon, known only by type material, is clearly closely related to *Geniostemon coulteri* but is readily distinguished by having foliage with papillose enations (vs. absent) and larger corollas (ca. 12 mm long vs. 13-14 mm). *Atarjea* is located in easternmost Guanajuato along the Querétaro border.

Geniostemon coulteri Engelm. & A. Gray, Proc. Amer. Acad. Arts 16:104. 1881. TYPE: MEXICO. [w/o locality] Hidalgo: Zimapan (?), Feb-Oct 1827, *Thomas Coulter 945* (HOLOTYPE: GH!). According to McVaugh (1943), Coulter resided in Zimapan, Hidalgo during the period indicated, and since the type lacks locality data I assume that he collected the plant in the vicinity of Zimapan. The collection number does not provide a clue as to his collection site since the species were assigned numbers according to their systematic arrangement (McVaugh 1943). Coulter presumably never visited the states of San Luis Potosí or Nuevo León, thus it is likely that the type was collected in Hidalgo, although it is possible that its collection might have been in the states of Querétaro or Guanajuato as he traveled between Zacatecas and Zimapan but, as noted by McVaugh, Coulter only rarely collected plants while "on-the-move".

Perennial (?) sprawling herbs 4-8 cm high. Stems glabrous, mostly unbranched, the leaves about as long as the internodes or somewhat longer. Mid-stem leaves linear-ob lanceolate, mostly 6-8 mm long, 2-3 mm wide, glabrous; petioles ca. 2 mm long, gradually tapering into the blades. Flowers mostly simple and terminal on glabrous pedicels 4-7 mm long. Sepals ca. 5 mm long, glabrous, acute. Corollas ca. 12 mm long, the lobes 9-10 mm long. Stamens exerted for ca. 6 mm; filaments 4-5 mm long, glandular-pubescent for ca. 1/2 its length near the middle, the hairs ca. 0.15 mm long; anthers yellow, ca. 1 mm long. Styles somewhat longer than the stamens, the apices flabellate. Capsules ellipsoid, 5-6 mm long, ca. 2 mm wide. Seeds globose, ca. 0.3 mm across.

The species is known only by rather fragmentary type material but seems readily distinguishable by habit and flower size as noted in the key to species.

In its seemingly sprawling habit, leaf shape, and corolla size, *Geniostemon coulteri* appears closely related to *G. atarjanum*, but the latter is readily dis-

tinguished by the papillose enations on stems and leaves (vs. enations absent) and larger corollas.

Geniostemon gypsophilum B.L. Turner, *spec. nov.* TYPE: MEXICO. Nuevo León: Mpio. Aramberri, San Francisco, gypsum hillside, 1750 m, large colonies among grasses, 26 Aug 1992, *G.B. Hinton et al. 22354* (HOLOTYPE: TEX).

Geniostemonem schaffneri Engelm. & A. Gray similis sed lobis corollarum minoribus (2-3 mm longis vs. 4-5 mm), antheris minoribus (0.5-0.7 mm longis vs. 0.8-1.2 mm), et foliis in sicco atrovirentibus (vs. viridis).

Annual mostly stiffly erect herbs 3-9 cm high, 2-13 cm across; the internodes as long as or longer than the leaves. Midstem leaves linear-oblongate mostly 4-7 mm long, 1-2 mm wide, glabrous, drying blackish-green. Pedicels mostly 4-6 mm long, glabrous. Sepals 2-3 mm long, glabrous, acute. Corollas mostly 4-6 mm long, purplish in bud, but white or creamy white when open, the lobes 2-3 mm long, ca. 1 mm wide. Stamens weakly exerted for 1-2 mm (the petals only rarely spreading); filaments 1-2 mm long, weakly glandular-pubescent, if at all, the hairs 0.05 mm long; anthers yellow, 0.5-0.7 mm long. Styles somewhat longer than the stamens, the apices weakly flabellate, if at all. Capsules narrowly ellipsoid, 3-4 mm long, ca. 1.5 mm wide. Seeds globose, ca. 0.3 mm across.

ADDITIONAL SPECIMENS EXAMINED: MEXICO. Nuevo León: ca. 30 km ENE of Dr. Arroyo in exposed gypsum, 2.5 km ENE of San Antonio de Peña Nevada, W base of Cerro Peña Nevada, 6600 ft, 3-5 Aug 1981, *Nesom 4266* (TEX); 15.5 mi ENE of junction with the Dr. Arroyo-Aramberri highway, 1940 m, 15 Sep 1988, *Nesom 6701* (TEX); Mpio. Galeana, 5.4 mi SE of junction with Linares-Entranque San Roberto along road S to Dr. Arroyo, gypsum shapes among scattered pines, 1940 m, 16 Oct 1988, *Nesom 6794* (TEX); 4 mi NW of Río San José, gypseous SE-facing slopes, 1490 m, 18 Sep 1993, *Nesom 7621* (TEX); Mpio Galeana, NE lowermost slopes of Cerro Potosí; gypsum soils along road to microwave station, ca. 12 mi NW of Galeana, 20 Aug 1979, *Turner & Davies A-26* (TEX); 1.6 mi N of Galeana on gypsum hillside, 10 Oct 1985, *Turner 15592* (TEX).

This taxon is very closely related to *Geniostemon schaffneri* but is readily distinguished by its smaller flowers which only rarely open (or upon dying tend to close) and foliage which turns blackish-green upon drying, as noted in the key to taxa. *Geniostemon gypsophilum* is found only on gypseous soils and was first collected by Guy Nesom on Cerro Peña Nevada in 1977 and I collected the second known specimen from Cerro Potosí in 1979 (with Frances

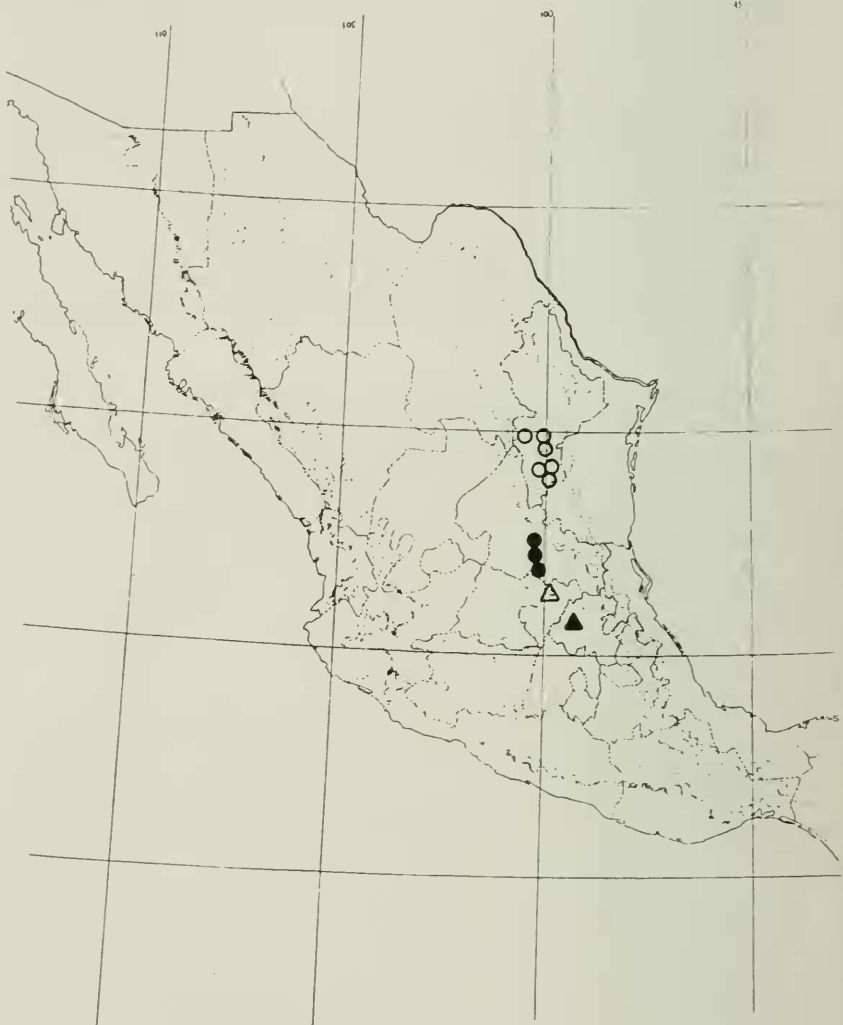


Figure 1. Distribution of *Geniostemon*: *G. atarjanum* (open triangle); *G. coulteri* (closed triangle); *G. gypsophilum* (open circles); *G. schaffneri* (closed circles).

Davies of K). Numerous collections have been made over the last 15 years, all upon rather bare gypseous soils.

Geniostemon schaffneri Engelm. & A. Gray, Proc. Amer. Acad. Arts 16:104 1881. TYPE: MEXICO. San Luis Potosí: mountainous areas in the vicinity of San Luis Potosí, Sep 1876, *J.G. Schaffner 80* (HOLOTYPE: GH!).

Annual divaricately branched herbs 6-10 cm high, 5-15 cm across. Stems glabrous, the internodes as long as or longer than the leaves. Midstem leaves mostly linear-lanceolate to linear-oblongate, mostly 4-6 mm long, 1-2 mm wide, glabrous, drying green. Pedicels mostly 4-15 cm long, glabrous. Sepals ca. 4 mm long, glabrous, acute. Corollas mostly 7-8 mm long, pink in bud, but white or creamy white after the petals spread, the lobes 4-5 mm long, 1.5-2.0 mm wide. Stamens exerted for ca. 3.5 mm; filaments ca. 3 mm long, markedly glandular-pubescent for ca. 1/2 its length near the middle, the hairs ca. 0.1 mm long; anthers yellow, 0.8-1.2 mm long. Styles somewhat longer than the stamens, the apices narrowly flabellate. Capsules narrowly ellipsoid, ca. 4 mm long, 1.5 mm wide. Seeds globose, ca. 0.3 mm across.

ADDITIONAL SPECIMENS EXAMINED: MEXICO. San Luis Potosí: Immediately N of Minas de San Rafael, 1100 m, 30 Jun 1972, *Chiang et al. 8164, 8168* (LL); highest point on gravel road between Villa Juárez and Buena Vista, 1450 m, 21 Jun 1982, *Nee & Diggs 24551* (TEX); San José Pass, 16 Aug 1890, *Pringle 3172* (GH,MO); Villar, 14 Sep 1893, *Pringle 5386* (GH); Minas de San Rafael, Nov 1910, *Purpus 4914* (GH,MO).

Geniostemon schaffneri is closely related to *G. gypsophilum* but differs in having larger flowers on mostly longer pedicels and foliage that tends to dry green (vs. blackish-green). It occurs on both calcareous and gypseous soils (according to label data) and appears to be confined to mountainous regions immediately east of the city of San Luis Potosí (Figure 1).

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